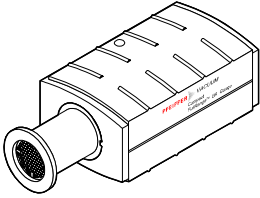


Trademarks

MaxiGauge™ INFICON GmbH
FullRange™ INFICON GmbH

Short Instructions
Incl. Declaration of Conformity

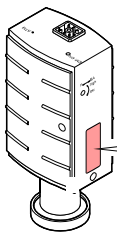
Compact FullRange™ BA Gauge
PBR 260



BG 805 131 BE / A (2005-10)

Product Identification

In all communications with Pfeiffer Vacuum, please specify the information on the product nameplate. For convenient reference copy that information into the space provided below.



Pfeiffer Vacuum, D-35614 Asslar
Typ: _____
No: _____
F-No: _____
_____ V _____ W

Validity

This document applies to products with part number

- PT R27 000 (DN 25 ISO-KF)
- PT R27 001 (DN 40 ISO-KF)
- PT R27 002 (DN 40 CF-R)

The part number (No) can be taken from the product nameplate.

If not indicated otherwise in the legends, the illustrations in this document correspond to the gauges with the vacuum connection DN 25 ISO-KF. They apply to gauges with other vacuum connections by analogy.

We reserve the right to make technical changes without prior notice.

All dimensions in mm.

Intended Use

The PBR 260 Compact FullRange™ BA Gauge has been designed for vacuum measurement of non-flammable gases and gas mixtures in a pressure range $5 \times 10^{-10} \dots 1000$ mbar.

The gauge is a part of the Pfeiffer Vacuum Compact Gauges family and can be operated in connection with the MaxiGauge™ vacuum measurement and control unit or with another evaluation unit.


Functional Principle


Over the whole measurement range, the PBR 260 Compact FullRange™ BA Gauge has a continuous characteristic curve and its measuring signal is output as logarithm of the pressure.

The gauge functions with a Bayard Alpert hot cathode ionization measurement system and a Pirani measurement system. In a defined overlapping pressure range, a mixed signal of the two measurement systems is output. Above that range, a Pirani signal, below that range, a hot cathode signal is output. The Pirani measurement system switches the hot cathode measurement system on and off to prevent filament burn-out and excessive contamination. Two switching on/off ranges are available.


Symbols Used

 **DANGER**
Information on preventing any kind of physical injury.

 **WARNING**
Information on preventing extensive equipment and environmental damage.

 **Caution**
Information on correct handling or use. Disregard can lead to malfunctions or minor equipment damage.

Personnel Qualifications

 **Skilled personnel**
All work described in this document may only be carried out by persons who have suitable technical training and the necessary experience or who have been instructed by the end-user of the product.

General Safety Instructions

- Adhere to the applicable regulations and take the necessary precautions for the process media used. Consider possible reactions between the materials (→ "Technical Data") and the process media. Consider possible reactions (e.g. explosion) of the process media due to the heat generated by the product.
- Adhere to the applicable regulations and take the necessary precautions for all work you are going to do and consider the safety instructions in this document.
- Before beginning to work, find out whether any vacuum components are contaminated. Adhere to the relevant regulations and take the necessary precautions when handling contaminated parts.

Communicate the safety instructions to all other users.

Liability and Warranty

Pfeiffer Vacuum assumes no liability and the warranty becomes null and void if the end-user or third parties

- disregard the information in this document
- use the product in a non-conforming manner
- make any kind of interventions (modifications, alterations etc.) on the product
- use the product with accessories not listed in the corresponding product documentation.

The end-user assumes the responsibility in conjunction with the process media used.

Gauge failures due to contamination, as well as expendable parts (filament), are not covered by the warranty.

Technical Data

Measurement range (air, N ₂)	5x10 ⁻¹⁰ ... 1000 mbar
Overlapping range hot cathode – Pirani	
high (default)	5.5x10 ⁻³ ... 2.0x10 ⁻² mbar
low	2.0x10 ⁻³ ... 8.0x10 ⁻³ mbar
Accuracy (10 ⁻⁸ ... 10 ⁻² mbar)	≈15 % measurement (after 5 min. stabilization)
Repeatability (10 ⁻⁸ ... 10 ⁻² mbar)	≈5 % measurement (after 5 min. stabilization)

Emission of hot cathode	
Switching on pressure (hi)	2.4x10 ⁻² mbar (default)
Switching off pressure (hi)	3.2x10 ⁻² mbar (default)
Switching on pressure (lo)	9.9x10 ⁻³ mbar
Switching off pressure (lo)	1.3x10 ⁻² mbar
Emission current (with decreasing pressure)	
7.2x10 ⁻⁶ mbar < p < 2.4x10 ⁻² mbar	25 µA
p ≤ 7.2x10 ⁻⁶ mbar	5 mA
Emission current switching	
25 µA → 5 mA (with decreasing pressure)	7.2x10 ⁻⁶ mbar
5 mA → 25 µA (with increasing pressure)	3.2x10 ⁻⁵ mbar


Degas (only if p < 7.2x10 ⁻⁶ mbar)	
current	approx. 16 mA / 4.0 W
control input signal	0 V / 24 V, PLC level, high active
duration	max. 3 min, followed by automatic stop
In degas mode, the PBR 260 keeps supplying measurement values the tolerances of which can be higher than during normal operation.	


Output signal (measuring signal)	
voltage range	0 ... 10.2 V
measurement range	0.774 V ... 10 V (5x10 ⁻¹⁰ mbar ... 1000 mbar)
relationship voltage-pressure	logarithmic, 0.75 V / decade
error signals	→ [1]
0.3 V	error hot cathode system
0.5 V	error Pirani system, electronics incorrectly mounted to sensor
underrange	0.5 V < U < 0.774 V
overrange	10 V < U ≤ 10.2 V (measuring signal limited to 10.2 V by software)
Minimum load	10 kΩ

Gauge identification (U _{max} = 4.25 V)	Resistor 17.2 kΩ referenced to supply common
--	--

Adjustment	
Pirani	automatic adjustment by hot cathode at 1 ... 3x10 ⁻³ mbar
HV	adjustment via ATM button (keep button depressed for at least 5 seconds) at atmospheric pressure
ATM (<ATM> button)	adjustment via ATM button (keep button depressed for at least 2 seconds) at ≤1x10 ⁻⁴ mbar
Zero point adjustment (<ATM> button)	factory adjusted, readjustment not required
Hot cathode	

Supply

 **DANGER**

 The gauge may only be connected to supply and evaluation units that conform to the requirements of a grounded protective extra-low voltage (SELV-E according to EN 61010). The connection to the gauge has to be fused. ¹⁾

Voltage at gauge	20 ... 28 VDC ²⁾ (max. ripple: 2 V _{pp})
Power consumption	
standard	≤0.5 A
degas	≤0.8 A
emissions start (200 ms)	≤1.4 A

¹⁾ The MaxiGauge™ fulfills these requirements.
²⁾ The minimum voltage of the power supply must be increased proportionally to the length of the sensor cable.



Power consumption	≤16 W
Fuse to be connected ¹⁾	≤1.25 AT
Voltage at the supply unit with maximum cable length	21 ... 28 VDC (max. ripple: 2 V _{pp})

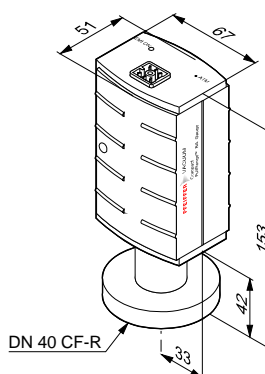
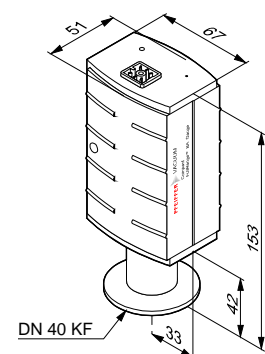
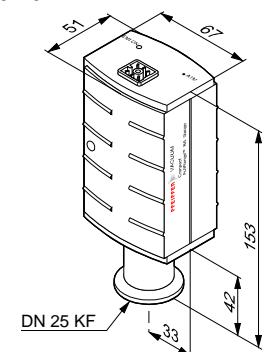
Electrical connection	Hirschmann compact connector GO 6, 6 contacts, male
Cable	5 poles plus screening
Cable length max.	35 m (0.25 mm ² conductor) 50 m (0.34 mm ² conductor) 100 m (1.0 mm ² conductor)

Grounding concept → Figure 1

Materials on the vacuum side	
housing, supports, screens	stainless steel
feedthrough	NiFe nickel plated
isolator	glass
cathode	iridium, yttrium oxide
cathode holder	molybdenum
Pirani element	tungsten, copper
Internal volume	
DN 25 ISO-KF	≤ 24 cm ³
DN 40 ISO-KF	≤ 24 cm ³
DN 40 CF-R	≤ 34 cm ³
Pressure max.	2 bar (absolute)

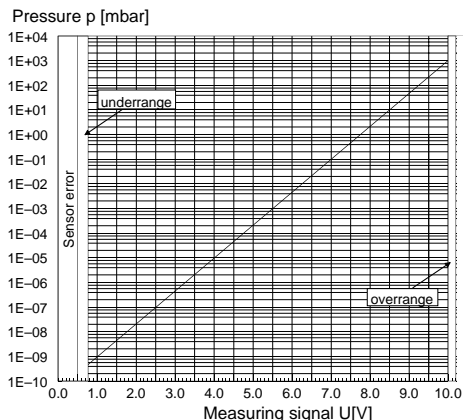
Admissible temperatures	
storage	-20 °C ... +70 °C
operation	0 °C ... +50 °C
bakeout	150 °C (without electronics unit or with extension)
Relative humidity	
year's mean	≤ 65% (no condensation)
during 60 days	≤ 85% (no condensation)
Use	
	indoors only
	altitude up to 2000 m
Type of protection	IP 30

Dimensions [mm]



Weight	285 g (Flansch DN 25 ISO-KF)
	315 g (Flansch DN 40 ISO-KF)
	550 g (Flansch DN 40 CF-R)

Measuring Signal vs. Pressure



$$p = 10^{(U-7.75)0.75+c}$$

U	p	c
[V]	[mbar]	0
[V]	[Pa]	2
[V]	[Torr]	-0.125

where
 p pressure
 U measuring signal
 c constant (pressure unit dependent)
 valid in the range
 $0.774 \text{ V} \leq U \leq 10.000 \text{ V}$

Gas Type Dependence

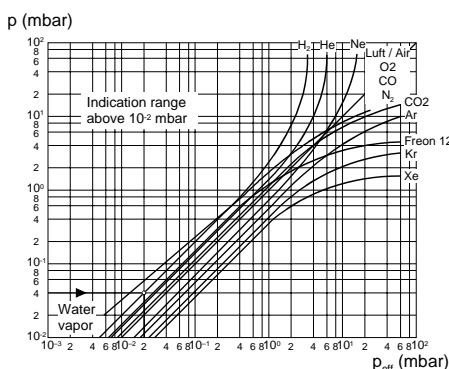
Hot cathode range

For gases other than air, the pressure in the indication range $p < 10^{-3}$ mbar can be determined by a simple conversion:

$$p_{\text{eff}} = K \times \text{indicated pressure}$$

Gas type	K (mean)
Air (N ₂ , O ₂ , CO)	1.0
Xe	0.4
Kr	0.5
Ar	0.8
H ₂	2.4
Ne	4.1
He	5.9

Pirani range



Installation

Vacuum Connection

STOP DANGER

Caution: overpressure in the vacuum system >1 bar

Injury caused by released parts and harm caused by escaping process gases can result if clamps are opened while the vacuum system is pressurized.

Do not open any clamps while the vacuum system is pressurized. Use the type of clamps which are suited to overpressure.

STOP DANGER

Caution: hazardous voltages

Incorrectly grounded products can be extremely hazardous in the event of a fault.

The gauge must be electrically connected to the grounded vacuum chamber. This connection must conform to the requirements of a protective connection according to EN 61010:

- CF flanges fulfill this requirement.
- For gauges with a KF flange, use a conductive metallic clamping ring.

Caution

Caution: vacuum component

Dirt and damages impair the function of the vacuum component.

When handling vacuum components, take appropriate measures to ensure cleanliness and prevent damages.

Caution

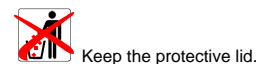
Caution: dirt sensitive area

Touching the product or parts thereof with bare hands increases the desorption rate.

Always wear clean, lint-free gloves and use clean tools when working in this area.

The gauge should be mounted so that no vibrations occur. The gauge may be mounted in any orientation. However, any particles and condensates present should not be able to penetrate into the measuring chamber. Install the gauge in such a way that it need not be removed for adjustment.

Remove the protective lid and install the product to the vacuum system.



Power Connection

Precondition: Vacuum connection is properly made.

Before connecting or disconnecting the product, turn off the control system.

- 1 If no sensor cable is available, make one according to the diagram.

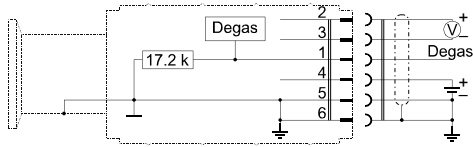


Figure 1: Electrical connection

- | | | |
|-------|--------------------|--|
| Pin 1 | a) Degas | |
| | b) Identification | |
| | ($U \leq 4.25$ V) | |
| Pin 2 | Signal output | |
| | (measuring signal) | |
| Pin 3 | Signal common GND | |
| Pin 4 | Supply | |
| Pin 5 | Supply common GND | |
| Pin 6 | Screening | |

- 2 Connect the signal cable to the gauge and secure it with the screw.

- 3 Connect the gauge to the measurement and control unit.

Operation

When the voltage is applied, the measuring signal is available between pins 2 and 3. Over the whole measurement range, the measuring signal is output as a logarithm of the pressure (Relationship between measuring signal and pressure → "Technical Data").

Allow for a stabilizing time of approx. 10 minutes. Once the gauge has been switched on, permanently leave it on irrespective of the pressure.

Gas Type Dependence

The measurement value is gas dependent. The display applies to dry air, N_2 , O_2 and CO. For other gases, it has to be converted (→ "Technical Data").

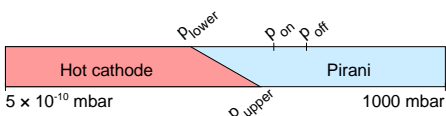
If the gauge is operated in connection with a MaxiGauge™ vacuum measurement and control unit, a calibration factor can be entered for correction of the reading (→ [2]).

Measurement Range

The PBR 260 covers the measurement range of 5×10^{-10} mbar ... 1000 mbar.

- The Pirani system continuously monitors the pressure.
- The hot cathode system (controlled by the Pirani) is only switched on when the pressure drops below the set threshold (p_{on}). The hot cathode will be ready for operation after a few seconds' heating time, when the <EMI ON> lamp is lit.
- When the pressure rises above the setpoint (p_{off}) the hot cathode is switched off and the <EMI ON> lamp turns off.

In the upper pressure range, the Pirani reading and in the lower pressure range, the hot cathode reading is output. In the overlapping range (p_{lower} ... p_{upper}), a combined signal of the two measurement systems is supplied:

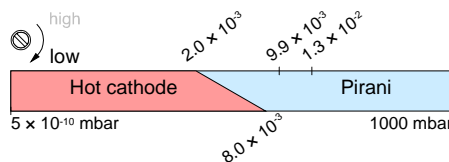
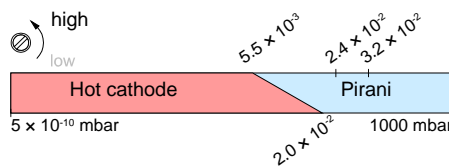
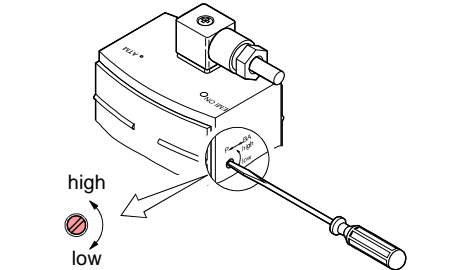


Defining the Switching on/off Range

The PBR 260 has two definable switching on/off ranges with their corresponding overlapping ranges. The switching on/off range is selected with the <P ↔ BA> switch and should be chosen in such a way that it is situated outside the process pressure range. The positions "high" (default) and "low" are available. Preferably, "low" should be selected as contamination of the hot cathode system is reduced at lower pressures.

Caution

The switching on/off range must be selected before the gauge is activated as the switch position is polled only when the gauge is switched on.



Adjusting the Gauge

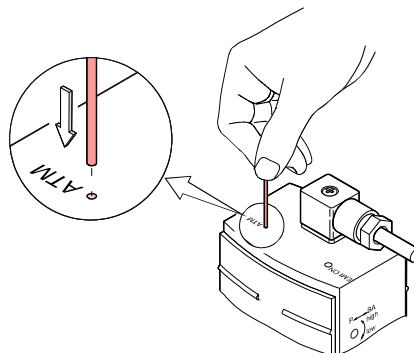
The gauge is factory calibrated. If used under different climatic conditions or in a different position, through aging or contamination, and after exchanging the sensor, the characteristic curve can be offset and readjustment can become necessary. Only the Pirani element can be adjusted. The hot cathode system is factory adjusted.

HV adjustment:

At $p \approx 2 \times 10^{-3}$ mbar the Pirani system is automatically adjusted by the hot cathode.

Adjustment at atmospheric pressure:

- 1 Operate the gauge for 10 minutes at atmospheric pressure. If the gauge was operated within the hot cathode range, a cooling-down time of approx. 30 minutes is to be expected (gauge temperature = ambient temperature).
- 2 Insert a pin through the opening marked <ATM> and push the button inside for at least 5 s.



Zero point adjustment:

A zero point adjustment is recommended

- after the sensor has been exchanged
- as part of the usual maintenance work for quality assurance.

The push button used for the adjustment at atmospheric pressure is also used for the zero point adjustment.

- 1 Operate gauge for approx. 10 minutes at a pressure of $\leq 1 \times 10^{-4}$ mbar.

- 2 Insert the pin through the opening marked <ATM> and push the button inside for at least 2 s.



The adjustment is done automatically and ends after 2 minutes.

Degas

Deposits on the electrode system of the hot cathode ionization gauge can lead to unstable measurement readings.

In such a case it is advisable to start a degas process of the anode (bakeout) at a pressure below 7.2×10^{-6} mbar (5 mA emission current). Depending on the application, this function can be activated via a MaxiGauge™ vacuum measurement and control unit, manually with a switch, or automatically by the system control (e.g. PLC). The bakeout process is automatically stopped by the PBR 260 after 3 minutes, if it has not been terminated before.

The degas process is activated when the control signal (Pin 1) switches from OFF (0 V) to ON (24 V). It is deactivated when the control signal switches from ON (24 V) to OFF (0 V), or after a maximum of 3 minutes.

For a repeated degas process, the control signal first has to switch from ON (24 V) to OFF (0 V), to then start the degas process again with ON (24 V). If the degas function is activated by the system control, it should be set to OFF again by the system control after max. 3 minutes of bakeout in order for an unambiguous operating status to be achieved.

The degas process causes a heating of the electron collector grid to approx. 700 °C by electron bombardment.

Deinstallation

STOP DANGER

Caution: contaminated parts
Contaminated parts can be detrimental to health and environment.
Before beginning to work, find out whether any parts are contaminated. Adhere to the relevant regulations and take the necessary precautions when handling contaminated parts.

Caution

Caution: vacuum component
Dirt and damages impair the function of the vacuum component.
When handling vacuum components, take appropriate measures to ensure cleanliness and prevent damages.

Caution

Caution: dirt sensitive area
Touching the product or parts thereof with bare hands increases the desorption rate.
Always wear clean, lint-free gloves and use clean tools when working in this area.

- 1 Vent the vacuum system.
- 2 Turn the gauge off.
- 3 Unplug the sensor cable.
- 4 Remove the gauge from the vacuum system and install the protective lid.

Maintenance, Troubleshooting

→ [1]

Gauge failures due to contamination, as well as expendable parts (filament), are not covered by the warranty.

Returning the Product

WARNING



Caution: forwarding contaminated products
Products returned to Pfeiffer Vacuum for service or repair should preferably be free of harmful substances (e.g. radioactive, toxic, caustic or microbiological).

Adhere to the forwarding regulations of all involved countries and forwarding companies and enclose a completed declaration of contamination.

Products that are not clearly declared as "free of harmful substances" are decontaminated at the expense of the customer.

When returning a product for service, put it in a tight and impact resistant package.

Disposal

DANGER



Caution: contaminated parts

Contaminated parts can be detrimental to health. Before beginning to work, find out whether any parts are contaminated. Adhere to the relevant regulations and take the necessary precautions when handling contaminated parts.

WARNING



Caution: substances detrimental to the environment

Electronic components must be disposed of in accordance with special regulations. Dispose of such products in accordance with the relevant local regulations.

Separating the components

After disassembling the product, separate its components according to the following criteria:

Contaminated components

Contaminated components (radioactive, toxic, caustic, or biological hazard etc.) must be decontaminated in accordance with the relevant national regulations, separated according to their materials, and recycled.

Other components

Such components must be separated according to their materials and recycled.

Further Information

[1] www.pfeiffer-vacuum.net
Operating Instructions
Compact FullRange™ BA Gauge PBR 260
BG 805 171 BE
Pfeiffer Vacuum GmbH, D-35614 Asslar, Deutschland

[2] www.pfeiffer-vacuum.net
Operating Instructions
MaxiGauge™ TPG 256 A
BG 805 186 BE
Pfeiffer Vacuum GmbH, D-35614 Asslar, Deutschland

Declaration of Contamination

The service, repair, and/or disposal of vacuum equipment and components will only be carried out if a correctly completed declaration has been submitted. Non-completion will result in delay. This declaration may only be completed (in block letters) and signed by authorized and qualified staff.

- 1 Description of product**
 Type _____
 Part number _____
 Serial number _____
- 2 Reason for return**

- 3 Operating fluid(s) used**
 (Must be drained before shipping.)

- 4 Used in copper process**
 no yes → Seal product in plastic bag and mark it with a corresponding label.
- 5 Process related contamination of product:**

toxic	no <input type="checkbox"/> 1)	yes <input type="checkbox"/>	
corrosive	no <input type="checkbox"/> 1)	yes <input type="checkbox"/>	
biological hazard	no <input type="checkbox"/>	yes <input type="checkbox"/> 2)	
explosive	no <input type="checkbox"/>	yes <input type="checkbox"/> 2)	
radioactive	no <input type="checkbox"/>	yes <input type="checkbox"/> 2)	
other harmful substances	no <input type="checkbox"/> 1)	yes <input type="checkbox"/>	

1) or not containing any amount of hazardous residues that exceed the permissible exposure limits 2) Products thus contaminated will not be accepted without written evidence of decontamination.

The product is free of any substances which are damaging to health. yes
- 6 Harmful substances, gases and/or by-products**
 Please list all substances, gases, and by-products which the product may have come into contact with:

Trade/product name manufacturer	Chemical name (or symbol)

Precautions associated with substance	Action if human contact
- 7 Legally binding declaration:**
 We hereby declare that the information on this form is complete and accurate and that we will assume any further costs that may arise. The contaminated product will be dispatched in accordance with the applicable regulations.
 Organization/company _____
 Address _____
 Post code, place _____
 Phone _____ Fax _____
 Email _____
 Name _____
 Company stamp _____

This form can be downloaded from our website.

Copies: Original for addressee
1 copy for accompanying documents
1 copy for file of sender

Declaration of Conformity



We Pfeiffer Vacuum, hereby declare that the equipment mentioned below complies with the provisions of the Directive relating to electrical equipment designed for use within certain voltage limits 73/23/EEC and the Directive relating to electromagnetic compatibility 89/336/EEC

Compact FullRange™ BA
Gauge
PBR 260

Part Numbers

PT R27 000 (DN 25 ISO-KF)
PT R27 001 (DN 40 ISO-KF)
PT R27 002 (DN 40 CF-R)

Standards

Harmonized and international/national standards and specifications:

- EN 50081-1 (Electromagnetic compatibility: generic emission standard)
- EN 50082-2 (Electromagnetic compatibility: generic immunity standard)
- EN 61010-1 (Safety requirements for electrical equipment for measurement, control and laboratory use)

Signature

Pfeiffer Vacuum GmbH, Asslar

18 November 2005

Wolfgang Dondorf
Managing director

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